Patrik Rydén
Dep. of Mathematics and Mathematical Statistics
Dep. of Statistics
Computational Life Science Cluster (CLiC)
Umeå University,
SE-901 87, Umeå
Sweden
patrik.ryden@math.umu.se

Yuri Belyaev
Dep. of Mathematics and Mathematical Statistics
Umeå University,
SE-901 87, Umeå
Dep. Of Forest Economics
Swedish University of Agriculture Sciences
SE-901 83, Umeå
Sweden
yuri.belyaev@math.umu.se

Statistical Analysis of Load-Sharing Models with Interval Censored Data

Abstract

We consider the problem of estimating the reliability function of failure stresses of bundles, constructed of several similar and parallel fibers, given interval censored data. Each bundle consists of several fibers which have their own independent and identical distributed failure stress and where the force applied to the bundle at any moment is distributed between the fibers according to the local load-sharing model suggested by H.E. Daniels in 1945.

The testing of bundles generates complexly structured interval censored data. By using martingale theory, we have developed a non-parametric estimator that, given the observed data, generates a consistent estimator of the desired reliability function. Moreover, by applying resampling it is possible to estimate the accuracy of the estimator. Numerical examples illustrate the behavior of the estimator when the number of fibers and bundles are varied.